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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/064,032

06/04/2002

Steinar Bjaerum

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11/20/2006

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EXAMINER

LAVIN, CHRISTOPHER L

ART UNIT

PAPER NUMBER

2624

DATE MAILED: 11/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/064,032

Applicant(s)

BJAERUM ET AL.

Examiner

Christopher L. Lavin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06/04/02 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the RCE filed on 09/06/06.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yamazaki (5,622,174), Washburn (6,017,309) and Becker (6,176,828).

In regards to claim 1, Yamazaki discloses In an ultrasound machine for generating an image responsive to moving structure within a region of interest of a subject by displaying at least one color characteristic corresponding to a movement parameter of said structure, apparatus for mapping said color characteristic comprising: a front-end arranged to transmit ultrasound waves into said structure and to generate received signals in response to ultrasound waves backscattered from said structure in said region of interest over a time period (Figure 54, items 11 and 15); a processor responsive to (i) said received signals to generate a set of parameter signals representing values of said movement parameter within said structure during said time period, (ii) a distribution of said set of parameter signals, and (iii) a mapping algorithm to generate a set of color characteristic signals representative of said values of said movement parameter (Figure 54, item 43; col. 26, line 51 – col. 27, line 44: Cardiac Velocity of a placed ROI is measured and a velocity color map is created to color the image.), [wherein said mapping algorithm comprises a mapping function formed by

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generating a cumulative total of frequency of occurrence of said values of said movement parameter, and normalizing the cumulative total to a color map, wherein said mapping function is used by said processor as a non-linear transfer function between said values of said movement parameter and said set of color characteristic signals]; and a display arranged to display a color representation of said moving structure in response to said set of color characteristic signals (Figure 60).

The previously added claim language requires an adaptive color-mapping step, which Yamazaki does not teach. However adaptive color mapping schemes in the ultrasound art are well known as shown by Washburn (col. 8, line 31 – col. 9, line 19). Washburn teaches creating an ultrasound velocity color map of blood flow using a histogram.

Therefore it would have been obvious to one skilled in the art at the time of the invention to use an adaptive color-mapping step as taught by Washburn in the apparatus disclosed by Yamazaki. Yamazaki teaches of using a lookup table to assign colors, as Washburn teaches (col. 7, lines 6 – 43) such a technique can lead to saturation, as well as prevent a full range of colors to be used. By Stretching out the histogram so as many colors as possible can be used the user will be able to better identify the structure, leading to better diagnoses.

The newly added claim language requires a “non-linear transfer function”. Washburn discloses the concept of an “S-curve” transfer function on col. 8, line 14. However this is mentioned only in passing and no further details are provided. To reinforce this idea the examiner is introducing Becker that is another patent from the

same company as Washburn, and many of the same inventors, which clearly teaches the concept of a non-linear transfer function as seen in figure 3.

Therefore it would have been obvious to one skilled in the art at the time of the invention to use a non-linear transfer function as taught by Becker in the apparatus disclosed by the combination of Yamazaki and Washburn. A non-linear transfer function will allow a narrow range of intensity data that makes up the majority of the data to be displayed over a broader color range.

In regards to claim 2, The apparatus of claim 1 wherein said moving structure comprises cardiac tissue (Figure 60).

In regards to claim 3, The apparatus of claim 1 further comprising a user interface arranged to enable an operator to select said region of interest from said image on a monitor (Figure 54, item 43; col. 26, line 51 – col. 27, line 44: The user places the ROI using the operation panel.).

In regards to claim 4, The apparatus of claim 1, wherein said movement parameter comprises one of velocity and strain rate (col. 26, lines 58 – 65).

In regards to claim 5, The apparatus of claim 1, wherein said color characteristic comprises hue (col. 26, lines 58 – 65: Hue is the gradation of color, as there are multiple colors used to display the velocity color map, this map's color characteristic comprises hue.)

In regards to claim 6, The apparatus of claim 1, wherein said time period comprises at least a portion of a cardiac cycle (col. 27, line 30).

In regards to claim 7, The apparatus of claim 1 wherein said distribution of said set of parameter signals comprises a histogram representing frequency of occurrence of said values of said movement parameter (col. 27, lines 37 – 44).

In regards to claim 8, The apparatus of claim 7 wherein said mapping algorithm generates a mapping function comprising a cumulative total of the occurrence of said values of said histogram (Washburn: col. 8, line 31 – col. 9, line 19).

In regards to claim 9, The apparatus of claim 8 wherein said mapping algorithm further comprises normalization of said cumulative total to a domain of a color characteristic legend (Washburn: col. 9, lines 3 – 19: Histogram equalization is normalization of the histogram.).

In regards to claim 10, The apparatus of claim 8 wherein at least one of said histogram and said mapping function is weighted (col. 8, lines 42 – 54: By maximizing low velocity flow Washburn is weighting the histogram and the mapping function.).

In regards to claims 11 – 17, claims 11 – 17 are rejected for the same reasons as claims 1 – 7. The argument analogous to that presented above for claims 1 – 7 is applicable to claims 11 – 17.

In regards to claims 18 – 20, claims 18 – 20 are rejected for the same reasons as claims 8 – 10. The argument analogous to that presented above for claims 8 – 10 is applicable to claims 18 – 20.

4. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Yamazaki, Washburn and Becker as applied to claims 1 and 11 above, and further in view of Pesque (5,718,229).

The combination of Yamazaki, Washburn and Becker disclose a system where a color map is stretched over the full dynamic range of a display. The well known meaning for dynamic range in the art is the range of brightness levels a display is capable of outputting. This is what Washburn is maximizing. By maximizing the dynamic range Washburn is allowing the maximum number of colors to be displayed. The Washburn reference is all about utilizing the most number of colors possible, but Washburn never specifies that the entire color spectrum (Red to Violet) is used in the color map. However it is well known in the art to utilize the entire spectrum in the art of ultrasound color mapping of movement as shown by Pesque (col. 4, lines 1 – 40).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to use the full color spectrum (as taught by Pesque) in the adaptive color-mapping scheme taught by the combination of Yamazaki, Washburn and Becker. By using the entire color spectrum in the color mapping the most number of varied colors will be applied allowing for the image with the most color variation and thus the most detail. The more detail a user can see the better the diagnosis will be.

Suggestions

5. The applicant on page 14 of the remarks requested suggestions for allowable material. Over the course of a month the examiner has repeatedly tried to reach the applicant's representative, Joseph Butscher, leaving several voice mail messages. Unfortunately the examiner was unable to make contact with Mr. Butscher. The examiner apologizes for not being able to make these suggestions over the phone, but the examiner could not wait any longer before sending out an action on this case.

6. Turning to the current claims. The examiner rejected the newly added claims using Becker, which clearly shows a non-linear transfer function. The examiner has carefully read over the specification and would like to point the applicant's representative to paragraph 42 of the specification and accompanying Figure 4c. The paragraph states that the normalizing results in a "uniform distribution of the values of the movement parameter across the domain of the color characteristic legend." This is a narrower definition of "normalizing" and would overcome the current art being used. The examiner has performed a quick search and was unable to find another reference teaching this concept. The examiner would need to perform a complete search to determine if this is an allowable feature, but at the very least it overcomes all current art being used.

Conclusion


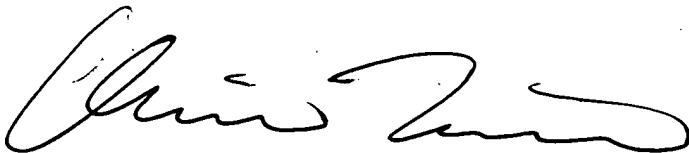
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher L. Lavin whose telephone number is 571-272-7392. The examiner can normally be reached on M - F (8:30 - 5:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh M. Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Christopher Lavin :



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